The closed flower of *Funastrum utahense* (Engelm.) Liede & Meve (Apocynaceae: Asclepiadoideae)

Richard E. Rintz
3455 County Road 4080, Salem, MO 65560
rasasiang@hotmail.com

ABSTRACT

A remarkable milkweed, *Funastrum utahense,* is shown by photos and diagrams to have replaced the corona by a highly-modified corolla. Published on-line **www.phytologia.org** *Phytologia 96(3): 189-194 (July 1, 2014).* ISSN 030319430

KEY WORDS *Funastrum utahense,* Apocynaceae, Asclepiadoideae, California, Nevada, Arizona, Utah.

This fairly small perennial vine with its unusual flowers ranges from southeastern CA, across southern NV, western AZ, to southwestern UT. It was first described by George Engelmann (Parry, 1875) as *Astephanus utahensis* from a specimen collected in the southwestern corner of UT. The genus name is Greek for 'without a corona.' There are at least four published drawings of the plant and its flower. A drawing of the flower alone was published in Jepson's Manual (1927), but shows the flower with a campanulate, un-furrowed corolla. Jaeger (1940) published a small sketch of the plant and gave it the common name "Deboltia", but it is referred to as "Utah vine milkweed" in Jepson's Manual, 2nd ed., 2012. Woodson (1941) in his major reorganization of the North American Asclepiadaceae, transferred it to *Cynanchum*, where it remained as *C. utahense* for half a century. Even so, Janish published the best drawing I've seen of it in Abrams' Flora (1951) but still under the name, *Astephanus utahensis*. Finally, Liede & Meve (2002) placed it in *Funastrum*. They included a drawing of the flower similar to my own (Fig. 2, D), but without discussion of the significance of the remarkable corolla. The present paper provides a closer view of this odd little flower.

OBSERVATIONS AND CONCLUSIONS

The flowers of *F. utahense* are much smaller than the other U.S. members of the genus. But what makes them so remarkable is that the open flowers are scarcely distinguishable from the closed ones, and they completely lack the fairly large, highly-visible coronas of the other members. According to Kunze (1991) they are "closed flowers," i.e. flowers in which only the proboscis of the insect enters the flower, while its body remains outside of it. In his original description, Engelmann postulated that the nearly-closed and internally-glandular-papillose corolla took the place of the corona, the purpose of which is to position the insects for pollination. When the flowers are open, there is only a small hole in the apex of the corolla, and sometimes 5 narrow, horizontal slits between the corolla lobes, and these are so small that any insects able to enter the flowers would be too small to pollinate them. It would seem that the tiny openings in the *F. utahense* flowers are intended solely to admit a proboscis. Delpino (in Hildebrand, 1867) noted that in milkweed flowers that have the nectar reservoirs alternate to the anther wings, as in the hoods of *Asclepias*, the corpuscula become attached primarily to the leg bristles of insects, but in those species where the nectar reservoirs are positioned beneath the anther wings, the corpuscula become attached to the proboscises. It has long been known (Galil and Zeroni, 1965) that in *Asclepias* the nectar is secreted by the filaments just behind the anther wings, and travels by tiny ducts to the hoods. In *Funastrum*, which lacks hoods, the nectar would flow downward and pool in reservoirs directly below the anther wings (see Fig. 2, F). However, since in *F. utahense* the corpuscula are covered by the arched lobes of the corolla, when the insect begins probing the flower with its proboscis, it is guided to the nectar reservoirs and to the anther wings by the alternating furrows of the pentagonal corolla tube (see Fig. 2, E). Engelmann was correct; in *F. utahense* the corolla takes the place of the corona so completely that

nothing has been omitted. Moreover, the interior of the flower is so densely papillose that it has the appearance of being carpeted. I suspect that these papillae provide the scent that attracts the insects to the flowers, at least those with proboscises 4-5 mm long.

In the population I examined in eastern San Bernardino Co., CA, near the Providence Mts., fruits were fairly common in May, 2005. It had been a very wet fall and winter. The plants were growing in the barely-perceptible drainage channels that fanned out across the nearly flat plain. I never found them outside of these channels.

ACKNOWLEDGEMENTS

I express my appreciation to James M. Andre, whose photos and location data on the internet enabled me to locate this site and study these remarkable plants. I also express my gratitude to Thomas J. Rosatti and Sigrid Liede-Schumann for reviewing the manuscript, and to Victoria MacMichael and Roy Gereau for their assistance in preparing it.

LITERATURE CITED

Abrams, L. 1951. Illustrated Flora of the Pacific States. Vol. 3, p. 376: Fig. 3832. Stanford U. Press.

Galil, J. & M. Zeroni. 1965. Nectar System of *Asclepias curassavica*. Bot. Gazette 126: 144-8.

Hildebrand, F. 1867. Federigo Delpino's Beobachtungen über die Bestäubungsvorrichtungen bei den Phanerogamen. Botanische Zeitung 25: 265-70.

Jaeger, E.C. 1940. Desert Wild Flowers: p. 184: No. 402, 186: Fig. 402. Stanford Univ. Press.

Jepson, W.L. 1927. A Manual of the Flowering Plants of California: p. 770: Fig. 756. Cal. School Bk. Depository.

Kunze, H. 1991. Structure and Function in Asclepiad Pollination. Pl. Syst. Evol. 176: 242.

Liede, S. & U. Meve. 2002. Dissolution of *Cynanchum* sect. Macbridea. Nordic Jour. Bot. 22/5: 579-91. See Fig. 3.

Parry, C.C. 1875. Botanical Observations in Southern Utah. Amer. Naturalist 9: 349.

Sundell, E.G. 1994. Asclepiadaceae. J. Ariz.-Nev. Acad. Sci. 27: 183.

Woodson, R.E. 1941. The North American Asclepiadaceae. Annals Missouri Bot. Gard. 28: 215.

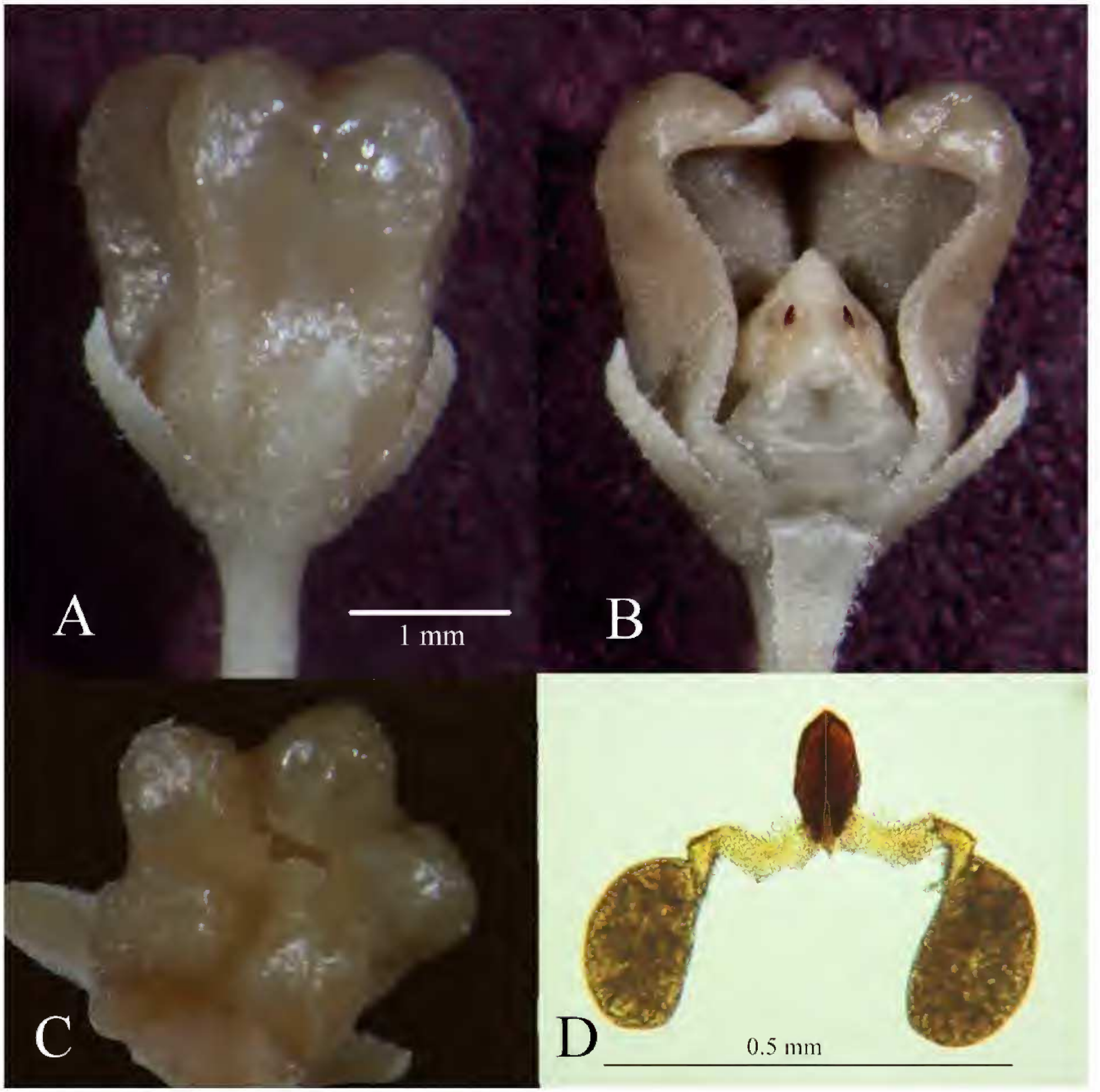

Figure 1. *Funastrum utahense* from flowers in alcohol. A. Intact flower in side view; the entire flower is about 4 mm long. B. Flower with two lobes cut away to show the interior; note the textured inner walls of the corolla and the deep furrow behind the gynostegium. C. Open flower from the top. D. Pollinarium.

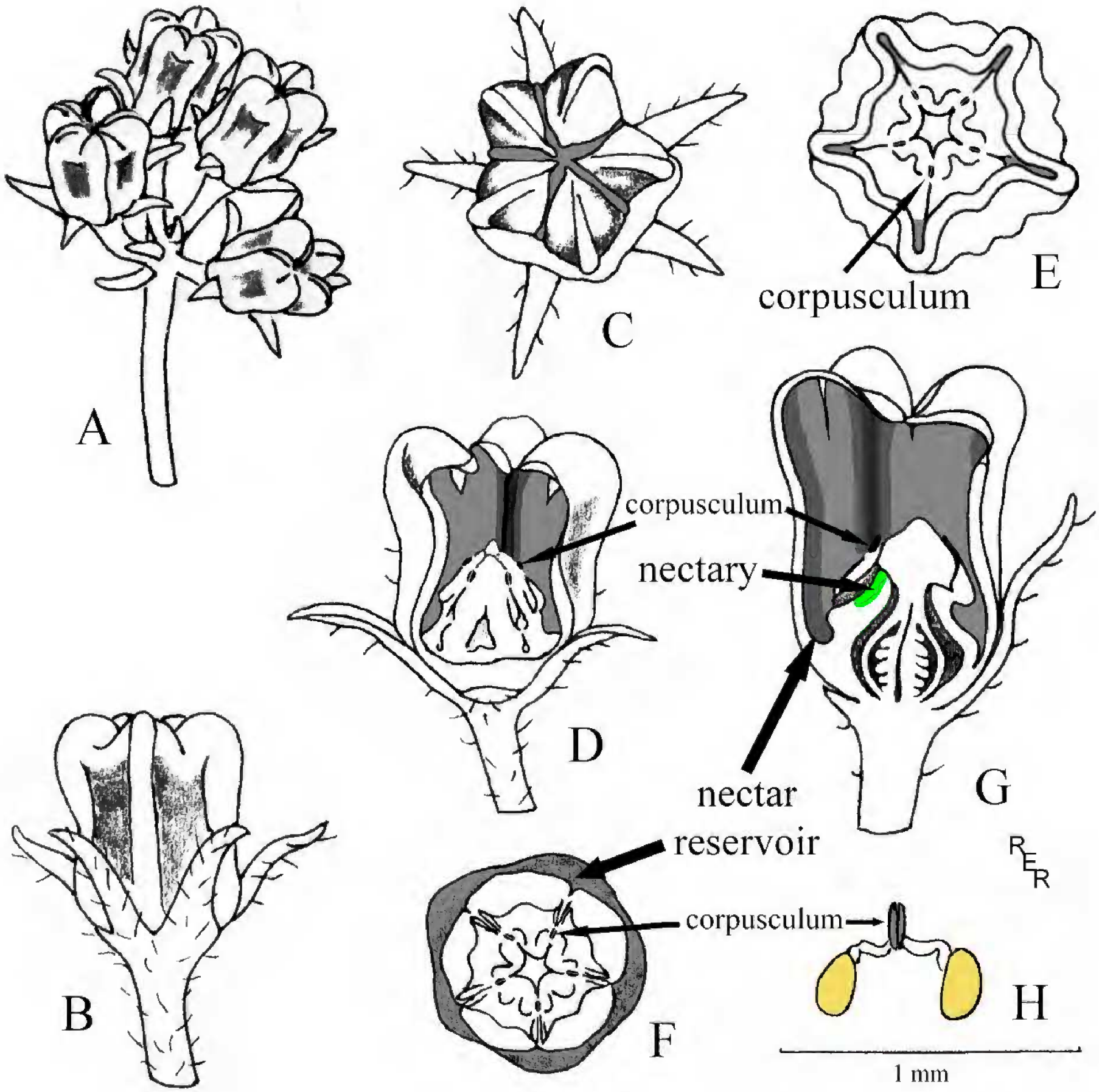

Figure 2. *Funastrum utahense*. A. Umbel of flowers. B. Flower in side view. C. Open flower from the top. D. Flower with two lobes removed to show the gynostegium. E. Flower with the top cut away to show the deeply-furrowed, pentagonal shape of the corolla. F. Gynostegium from the top showing the nectar reservoirs just below the anther wings. G. Flower in radial section. H. Pollinarium.

Figure 3. *Funastrum utahense*. Blooming plant. The flowers turn from yellow to orange as they age.

Figure 4. *Funastrum utahense*. Plant with three fruits.